

ABSTRACT

The present invention provides a grain-oriented electrical steel sheet with an extremely low core loss by scanning by a small focused laser beam spot and a method of production of the same, that is, a grain-oriented electrical steel sheet improved in electrical characteristics by scanning by a continuous wave fiber laser of the TEM<sub>00</sub> mode with a wavelength  $\lambda$  of  $1.07 \leq \lambda \leq 2.10$   $\mu\text{m}$  substantially perpendicular to the steel sheet rolling direction and at substantially constant spacing and a method of production of the same, wherein a rolling direction focused spot diameter  $d$  (mm) of the irradiated beam, a linear scan rate  $V$  (mm/s) of the laser beam, an average output  $P$  (W) of the laser, a width of the formed laser scribing traces or width of the electrical domains  $W_1$  (mm), and a rolling direction  $P_1$  (mm) of the laser scribing traces are in the following ranges:

$$0 < d \leq 0.20$$

$$0.001 \leq P/V \leq 0.012$$

$$0 < W_1 \leq 0.20$$

$$1.5 \leq P_1 \leq 11.0$$